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EXAMINER	
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ART UNIT	PAPER NUMBER
1778	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/589,331	YOSHIDA, HIROYUKI	
	Examiner	Art Unit	
	LUCAS STELLING	1778	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 May 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-30* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☒ Claim(s) *3-8,24,25,27 and 28* is/are allowed.

7)☒ Claim(s) *1, 2, 9-23, 26, 29 and 30* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5-6-11 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2, 23, 26, and 30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 2 recites the limitation of “to form desired steady concentration profiles of the decomposition product in the reactor.” It is unclear what is meant by a steady concentration profile. It could mean that the concentration is constant through the reactor. It could mean that the concentration gradient in the reactor at any given time is smooth. It could mean that the concentration gradient in the reactor is constant over time. It could mean that the concentration for certain constituents at a given point over a given period of the time remains relatively constant.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 9-13, 15, 23, 26, 29 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 4,014,786 to Potter et al. ("Potter").

5. As to claim 1, Potter teaches a method for producing sub-critical water decomposition products, comprising:

continuously supplying material to be processed into a vertical reactor through an inlet provided for the reactor **(See col. 8 lines 20-30; also the decanter is considered a reactor since it operates at a range of 212 to 650F, which is capable of allowing reactions to occur in the feed)**, whose interior is kept at a sub-critical condition for water **(See col. 8 lines 45-55)**; and

continuously taking out a liquid containing a decomposition product through any selected one of a plurality of outlets provided in a wall of the reactor at different respective positions from a position where the inlet of the reactor is provided **(See 20 in Figure 1, sample ports are provided for drawing off liquid samples, see col. 2 lines 60-68; during the period when a sample is drawn off the flow is continuous)**, wherein selection of one of the outlets adjusts a distance along which the liquid containing the decomposition product flows through the reactor so as to adjust residence time of the liquid containing the decomposition product in the reactor **(The liquid containing the decomposition product ordinarily flows upward and is**

drawn off the top, but opening a trycock will cause liquid containing decomposition product adjust the residence time of the liquid flowing through the trycock outlet).

6. As to claim 2, Potter teaches a method of producing sub-critical water decomposition products, comprising:

continuously supplying material to be processed into a vertical reactor through an inlet provided for the reactor**(See col. 8 lines 20-30; also the decanter is considered a reactor since it operates at a range of 212 to 650F, which is capable of allowing reactions to occur in the feed)** whose interior is kept at a sub-critical condition for water**(See col. 8 lines 45-55)**;

continuously taking out a liquid containing a decomposition product through any one of a plurality of outlets provided at a different position from a position from a position where the inlet of the reactor is provided **(See 20 in Figure 1, sample ports are provided for drawing off liquid samples, see col. 2 lines 60-68; during the period when a sample is drawn off the flow is continuous)**, to form desired steady concentration profiles of the decomposition product in the reactor **(See col. 2 lines 60-68, sampling provides information about the concentration of decomposition products at a given height in the reactor; and the profile is kept steady in that organics fraction exit the top while water fraction exits the bottom)**; and

taking out the desired decomposition product through at least one of the outlets, the at least one of the outlets being provide at a position where the concentration of the desired decomposition product is high **(The liquid containing the decomposition**

product ordinarily flows upward and is drawn off the top, but opening a trycock will cause liquid containing decomposition product adjust the residence time of the liquid flowing through the trycock outlet, drawing off from the decomposition product phase will take out products from the outlet where the concentration of the product is high).

7. As to claims 9 and 23, Potter teaches the methods of claims 1 and 2, and Potter teaches 300°F, which is approximately 149°C, and that the pressure is enough to keep the liquid from vaporizing **(See col. 8 lines 45-55)**, moreover the water is drained as a liquid, therefore, the pressure is in a range equal to or higher than a saturated water vapor pressure in order to maintain liquid water at the temperature.

8. As to claims 10, and 26, Potter teaches the methods of claims 1 and 2, and provides that the material to be processed is the carbonaceous waste left over after reaction of a hydrocarbonaceous fuel **(See col. 50-65, and see col. 6 lines 20-30 and col. 6)**. Potter explains that one of the hydrocarbonaceous materials is cellulose **(See Potter col. 5 lines 55-65)**. Accordingly, the reaction products from cellulose are considerd to be a waste of natural organic matter which is then supplied to the vessel **(11)** in Potter.

9. As to claim 11, Potter teaches an apparatus comprising:

a reactor **(11, the vessel is fully capable of permitting reactions to occur)**,

heating means for heating a mixture **(See col. 8 lines 45-55, the vessel is operated at an eleveated temperature, the previous reaction area acts as a heating means to provide heat to the incoming material)**,

compressing means for compressing the mixture **(See col. 6 lines 47-50, Potter contemplates that the mixture is pumpable, and that the vessel operated at elevated pressure, accordingly a compressing means is within the teaching of the reference)**;

introducing means for introducing the material to be processed **(See again col. 6 lines 47-50, the pump is considered to be an introducing means, this is consistent with applicant's specification definition of introducing means, see e.g. [0057])**;

an inlet through which the material to be processed is to be introduced into the reactor **(See Potter 51)**; and

a plurality of outlets provided in a wall of the reactor for letting out a mixture of a decomposition product and water from the reactor, wherein the outlets are provided at respective positions which are different from one another in a flow direction to the sub-critical water, and which are different from a position at which the inlet is provided **(See 20 in Fig. 1)**,

wherein the reactor is a vertical reactor **(See in Fig. 1)**.

It is acknowledged that applicant claims that liquid flows in only one vertical direction and that the reactor is configured to decompose material to be processed, however this is considered to be applicant's intended use. See MPEP 2114.

10. As to claim 12, Potter teaches an apparatus comprising:

a vertical reactor **(11, the vessel is fully capable of permitting reactions to occur)**;

heating means for heating a mixture **(See col. 8 lines 45-55, the vessel is operated at an eleveated temperature, the previous reaction area acts as a heating means to provide heat to the incoming material)**and compressing means for compressing the mixture **(See col. 6 lines 47-50, Potter contemplates that the mixture is pumpable, and that the vessel operated at elevated pressure, accordingly a compressing means is within the teaching of the reference)**, so as to form and keep a sub-critical condition for water **(See col. 8 lines 45-55, the vessel is capapble of subcritical conditions)**;

introducing means for introducing the material to be processed into the reactor **(See again col. 6 lines 47-50, the pump is considered to be an introducing means, this is consistent with applicant's specification definition of introducing means, see e.g. [0057])**;

an inlet through which the material to be processed is to be introduced **(See Potter 51 50)**; and

an outlet for letting out a mixture of water and decomposition product from the reactor **(20, 30, and 32 in Fig. 1)**, wherein

the reactor is arranged substantially vertically **(Fig. 1)**;

the inlet is provided for at least one of a top end portion or a bottom end portion of the reactor **(See 51 and 50 in Fig. 1, the inlet is provided at a bottom end portion)**, and wherein the position of the outlet is adjustable **(See col. 2 lines 60-65; the outlet position is adjustable by opening different trycocks)**.

11. As to claim 13, Potter teaches the apparatus of claim 12, and provides for a plurality of positions on a sidewall of the reactor along a flow direction **(See 20 in Fig. 1)**.

12. As to claim 15, Potter teaches the apparatus of claim 12, and Potter teaches that the vessel is provided with a monitoring means through which the interior is visualized **(See 21 is a sightglass)**.

13. As to claims 29 and 30, Potter teaches the method of claims 1 and 2, and in Potter the organic fraction of liquid flows in the upward direction only towards the upper outlet **(See e.g. in the Figs and col. 3 lines 5-10, and see col. 9 lines 5-15)**.

14. Claims 2, 26, and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 4,589,927 to Allen ("Allen").

15. As to claim 2, Allen teaches a method comprising:

continuously supplying material to be processed into a vertical reactor through an inlet provided for the reactor**(See col. 2 lines 5-35, material to be treated is supplied through inlet 7 of the reactor and is continuously supplied to provide a fluidization of the particles in the reactor)**, whose interior is kept at a sub-critical condition for water**(See throughout conditions below critical conditions for water are contemplated in the reactor)**;

continuously taking out a liquid containing decomposition produces through any one of a plurality of outlets provided at a different position from a position where the inlet of the reactor is provided**(See col. 2 lines 35-55; and col. 3 lines 10-25; the water is**

taken off through a side of the reactor and the offtake is then split and provides liquid to 20 and the separator 9; at least 19, 11 and 16, and 20 provide a plurality of outlets), to form desired steady concentration profiles of the decomposition product in the reactor **(See col. 3 lines 15-25; taking off liquid and recirculating it facilitates multiple passes through the reactor and removal of products to thereby facilitate the creation of concentrations the desired products in the reactor; causing a more even concentration profile through the reactor)**;. and

taking out the desired decomposition product through at least one of the outlets, the at least one of the outlets being provided at a position where the concentration of the desired decomposition product is high**(See col. 2 lines 35-65; water drawn off from the side offtake is provided to separator 9 and then solids are provided to the secondary reactor 10, from which product is removed via 16. Therefore the product is within the water drawn off from the reactor. And since the product is in the stream drawn off, the concentration will be higher than near the bottom inlet of the unreacted starting materials)**.

16. As to claim 26, Allen contemplates that the reactant material comes from wastewater **(See Allen col. 5 lines 10-15).**

17. As to claims 30, in Allen the water flows vertically from the bottom to the top in the reactor **(See in the Fig. and see col. 2 lines 35-50)**.

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

19. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

20. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Potter in view of U.S. Patent No. 4,797,989 to Geissbuehler et al. ("Geissbuehler").

21. As to claim 14, Potter teaches the apparatus of claim 12, but provides multiple outlets for removal of different product streams from different vertical heights within the vessel **(See Potter 20)**, however Potter does not contemplate using a moveable outlet. Geissbuehler teaches using an adjustable height outlet in a vertical column **(See Geissbeuhler abstract and col. 1 lines 54-58)**. Geissbuehler recognizes that an adjustable height outlet allows for adjusting the product discharge **(See Geissbuehler col. 3 lines 10-13)**. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to provide for an axially displaceable outlet in the

vessel of Potter in order to adjust the discharge from the column by moving an outlet as taught by Geissbuehler.

22. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Potter.

23. As to claim 16, Potter teaches a cylindrical vessel **(See in Fig. 1)**, the inlet is formed of tubular pipe and is therefore circular **(See in Fig. 1)**, but Potter does not mention that the inlet is a range of 1/5 to 1/15 time an inner diameter of the cylindrical vessel. However, Potter explains that the volume of the reactor size is selected to provide a desired residence time given a specific flow rate. Accordingly a person having ordinary skill in the art would have found it obvious to select a desired diameter difference between the vessel and the inlet pipe in order to control the residence time. *Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill in the art and would have been obvious, consult In re Boesch and Slaney (205 USPQ 215 (CCPA 1980)).* Furthermore the selection of a particular relative dimension is not patentably significant unless it can be shown that it causes the device to operate differently from the prior art in an unobvious way. See MPEP 2144.04(IV)(A).

24. As to claim 17, Potter teaches the apparatus of claim 12, but Potter does not teach a plurality of the vessels. However, providing a plurality of the vessels in for example a parallel arrangement is seen as an obvious duplication of parts which would provide the predictable result of higher throughput, and scalability of throughput as vessels can be taken on or offline. See MPEP 2144.04(VI)(B).

25. Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Potter in view of U.S. Patent Application Publication No. 2003/0189012 to Cansell ("Cansell").

26. As to claims 18, Potter teaches the apparatus of claim 12, and Potter teaches using the drawn off organics to but Potter does not teach that the apparatus further comprises a tubular reactor for secondary reaction joined to the outlet of the reactor; and an inner diameter of the tubular reactor for secondary reaction is within a range of 1 to 1/5 times the inner diameter of the vertical cylindrical tubular vessel. Cansell is directed to a system for oxidation of waste using a tubular reactor, which includes organic wastes **(See e.g. Cansell [0002] and [0003] and in the Figures)**. Cansell provides a long tubular reactor which is used to process effluent **(See again in the Figures and [0003])**, thereby meaning that the reactor in Cansell is contemplated as receiving fluid from another system. Cansell teaches that the use of hydrothermal oxidation in the tubular reactor is the gradual oxidation of the organic substances in an effluent in order to decompose the organic watse to water and carbon dioxide **(See Cansell [0014]; and [0003])**. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of invention to supply the effluent in Potter to the reactor of Potter in order to thereby oxidize the organics gradually using hydrothermal oxidation as taught by Cansell.

27. Although there is no indication in Cansell that the reactor would fall within a range of 1 to 1/5 of the diameter of the reactor in Potter, this is seen as an obvious

selection of size and relative dimension. See MPEP 2144.04(IV)(A). A person having ordinary skill in the art at the time of invention would have found it obvious to optimize the size of the tubular reactor in Cansell in order to accommodate a given flow rate.

28. As to claim 19, Potter and Cansell teach the apparatus of claim 18, and the reactor in Cansell comprises a plurality of tubular reactors which are connected in series with one another **(See Cansel in the Figs. at least between 24 and 30, between 30 and 32, and after 32 are considered tubular reactors, which are connected in series)**.

29. As to claim 20, Potter and Cansell teach the apparatus of claim 18, and Cansell teaches that the reactors include a heating and cooling means for controlling the reactor temperature in the tubular reactor **(See Cansell 38 and 36, the heat exchanger is used to cool the reaction exiting the reactors and to use that waste heat to warm the effluent entering the reactors)**.

30. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Potter in view of U.S. Patent No. 4,597,773 to Quintana et al. ("Quintana").

31. As to claims 21 and 22, Potter teaches the apparatus of claim 12, but does not mention the use of a back-pressure valve or a cooling pipe immediately before the back-pressure valve. Quintana is directed to a process and system for the partial oxidation of hydrocaronaceous fuel, and uses a vessel similar to the vessel of Potter **(See 110 in Fig. 1)**. Quintana provides for a pressure relief valve, connected to an outlet of the vessel via a pipe **(See 133 and 134 in Fig. 1)**. Quintana explain that the

use of the pipe and valve draws liquid from the outlet and then reduces its pressure **(See col. 13 lines 5-17)**. The pipe extending outside of the reactor to the pressure reducing valve will allow for some cooling to the liquid in the pipe to occur, and a person having ordinary skill in the art at the time of invention would recognize that the use of a pressure reducing valve facilitates maintaining the pressure upstream of the valve in the vessel. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of invention to provide a pressure relief valve connected by a pipe in Potter in order to facilitate reducing the pressure of the liquid after it leaves the vessel as taught by Quintana. In doing so, the pipe would allow for cooling of the liquid leaving the vessel, and the pressure release valve would facilitate maintaining pressure in the vessel.

32. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Allen in view of U.S. Patent No. 5,386,055 to Lee et al. ("Lee").

33. As to claims 23, Allen teaches the method of claim 2, and Allen provides for chemical treatment of reactants using gas, and contemplates a wide variety of reactants including waste treatment **(See Allen col. 5 lines 1-20)**. But Allen does not contemplate sub-critical water decomposition occurring at 130°C to 374°C, with an accompanying reaction pressure which is higher than the water vapor pressure at a given temperature. Lee is directed to a depolymerization process in which is carried out at subcritical temps between 200 and 374, and associated pressures **(See Lee col. 7 lines 30-40)**. It is acknowledged that Lee teaches that such subcritical temperatures

are not preferred as they require larger residence times, however in view of the reaction process in Allen the flow is recirculated to provide a desired residence time in the reactor, and this will mitigate the residence time issue identified by Lee. Also, a person having ordinary skill in the art at the time of invention would have also recognized that the use of sub-critical temperatures would allow for decomposition at lower temperatures and pressures than supercritical processing. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of invention to provide a temperature between 130 and 374, and associated pressures, in order to provide for elevated temperature subcritical processing of reactants, while still providing lower temperatures and pressures than supercritical processing.

Allowable Subject Matter

34. Claims 3-8, 24, 25, 27, and 28 are allowed.

35. The following is an examiner's statement of reasons for allowance: Allen is the nearest prior art to claims 3, 4 in that multiple outlets are provided for a fluidized bed reactor, and that the decomposition product is taken out of one of the outlets and that the distance through which the reactants flow in the reactor is adjusted.

36. However, with respect to claim 3, Allen does not teach nor does Allen fairly suggest that the steady flow flowing in an opposite direction to a direction in which the solid matter sinks or floats up and being slower than a sinking velocity or floating velocity of the solid matter, in which the solid matter is decomposed in the reactor. Instead in Allen the solid matter which forms in a steady flow in the fluidized bed is not a decomposable reactant but is particle physically resistant, and is not used up in the

process (See Allen col. 4 lines 50-55), also the reactants which are decomposed in Allen pass through the reactor at high velocities (See Allen col. 3 lines 10-25).

37. And with respect to claim 4, Allen does not teach nor does Allen fairly suggest that the mixture containing solid matter introduced in the inlet is caused to flow in a steady state in an opposite direction to a direction in which the solid matter flows, the solid matter decomposing and the fine particles fluidizing. Instead in Allen the solid matter which forms in a steady flow in the fluidized bed is not a decomposable reactant but is particle physically resistant, and is not used up in the process (See Allen col. 4 lines 50-55), also the reactants which are decomposed in Allen pass through the reactor at high velocities (See Allen col. 3 lines 10-25).

38. Potter is different from claims 3 and 4 in that Potter does not teach or fairly suggest forming in the steady flow, at least a fluidized bed in which the solid matter is decomposed into fine particles by the sub-critical water and the fine particles fluidize in the flow, and a sub-critical water dissolution part in which the material to be processed is turned into further finer particles or completely turned into a soluble material to flow with the sub-critical water.

39.

Response to Arguments

40. Applicant's arguments filed 5-6-11 have been fully considered but they are not persuasive.

41. Applicant's arguments with respect to claims 1, 9, 10, 11-22, and 29 have been considered but are moot in view of the new ground(s) of rejection.

42. Applicant argues with respect to claim 2, that Allen does not disclose continuously taking out a liquid containing a decomposition product to form steady concentration profiles of the decomposition product in the reactor as required by claim 2. In response, Allen takes off liquid to recirculated it which facilitates multiple passes through the reactor and the removal of products, which will thereby facilitate the creation of the desired products within the reactor. The recirculation of slurry allow for the reactor running at a high flow rate to increase the efficiency in high flow rate situations and for removing products to keep the reaction rate from decreasing. Forming a stratified fluidized bed of the particles in the reactor will cause the concentration profile in the reactor to become more steady since the reactions with the particles will occur at designated locations within the reactor **(See e.g. 13 throughout the reactor and 2 in the lower portion)**. Moreover, drawing off the liquid at the top and recirculating it will further stabilize the concentration profile by causing the incoming liquid to be more similar to the exiting liquid, thereby stabilizing the profile along the length of the reactor.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LUCAS STELLING whose telephone number is (571)270-3725. The examiner can normally be reached on Monday through Friday 9:00AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Lucas Stelling/
Examiner, Art Unit 1778